

Available online at www.sciencedirect.com**SciVerse ScienceDirect**

Procedia - Social and Behavioral Sciences 33 (2012) 45 – 49

Procedia
Social and Behavioral Sciences

PSIWORLD 2011

Study about the computer-imposed time and the self-imposed tempo coefficients in determining intersegmental coordination - implications for individual and team sports

Silvia Teodorescu^a, Aura Bota^a, Georgeta Mitache^a, Radu Predoiu^{a*}^a*U.N.E.F.S. Bucharest, Constantin Noica, No. 140, 060057, Romania*

Abstract

The purpose of this study consists in the investigation of some psychomotor related parameters determining motor coordination (performance coefficient, self-imposed tempo, personal optimum rhythm) that influence the performing of different technical elements. The computerized assessment RCMV, consists in issuing a response by activating the handles or pedals (left/right) according to the squares' position and number, once these appear on the screen. A number of 108 athletes participated in the study, out of which 52 performed individual sports and 56 performed team sports. Using t test, significant differences between subjects were identified, ($p < 0,05$), concerning intersegmental coordination.

© 2012 Published by Elsevier B.V. Selection and/or peer-review under responsibility of PSIWORLD2011

Open access under [CC BY-NC-ND license](https://creativecommons.org/licenses/by-nc-nd/4.0/).

Keywords: intersegmental coordination, computer-imposed time coefficient, self-imposed tempo coefficient, personal optimum rhythm coefficient

1. Introduction

Considered essential to child's development and to the reeducation-rehabilitation process, psychomotor control also influences sports performance capacity, through the consensual participation of the psychical area and of the motor finalization specific to different sports branches. In this context, the high level of modern sports performances imperiously claims an interdisciplinary-type approach, within which psychomotor control offers an interesting and rich area of investigation, both from the theoretical

* Radu Predoiu. Tel : +4 072 913 4360; fax: +4 021 312 0400.

E-mail address: radu_predoiu@yahoo.com.

perspective and particularly from that of the opportunities to have training interventions in order to render efficient the competitive performance.

As a component part of the psychomotor domain, coordination is regarded by most of the authors (Aniței, M, 2007, G. Mitache, S. Tudos, 2004; P. Hirtz, 2001) as one of the most challenging topics of investigation, relevant to sport psychologists and coaches, as well as a complex quality conditioning motor control capacity, motor learning capacity, adaptation and re-adaptation capacity, vigilance, all these conferring the athlete self-confidence, accuracy and efficiency when performing the specialized skills.

2. Organization of the research

2.1. Scope

In this paper, we aim at identifying some psychomotor-related parameters (performance coefficient, self-imposed tempo, personal optimum rhythm) which determine the intersegmental coordination and the performing of different sports technical elements.

2.2. Subjects

In this research, we tested 108 subjects aged 19 to 23 years old, students at UNEFS Bucharest; among them, 52 performed some individual sports (gymnastics, track and field, swimming, tennis) and 56 performed some team sports (basketball, handball, football). Each group of subjects was made up of an equal number of males and females. Tests were conducted within the Sports Psychology discipline practical lessons, under the same conditions and at the same time interval.

2.3. Methods

To solve the research issues, we used: bibliographical study, observation, test, statistical processing methods - SPSS (M. Popa, 2004) and data interpreting.

2.3.1. Test description

The RCMV test is included into the PSISELTEVA battery, developed by RQ Plus in 2001. The test consists in displaying a soft made up of 38 images that present, at variable time intervals and in a randomized order, square-shaped centrally-left/-right, upward/downward positioned relevant stimuli, as well as a red-coloured upward-right positioned circle. The subject must respond through a motor reaction of his upper limbs (button pressing) and lower limbs (pedal pushing), by a homogeneous/heterogeneous bi-segmental or multi-segmental combination, depending on the number and position of the displayed squares. The red circle in the upward-right corner claims the hand one-segmental movement. The test is individually applied and lasts about 10 minutes.

Among all the coefficients provided by the battery soft, we shall present the following parameters:

- MRT (mean of the reaction time) - mean of the latency time measured in hundredths of second;
- Adeq. C (adequacy coefficient) - a qualitative measure statistically calculated by correlating the test scores (the correct ones, errors, omissions) to the total number of stimuli;
- Perf. C (performance coefficient) - statistically calculated relying on the ratio between the adequacy coefficient and the average reaction time, considered relevant for the investigated characteristics. They correspond to the computer-imposed time (V_1 slow variant/ V_2 quick variant).
- STC (self-imposed tempo coefficient) - the time, measured in seconds, in which the task has been completed;

- PRC (personal optimum rhythm coefficient) - a qualitative measure statistically calculated by correlating the number of errors to the total number of stimuli for the self-imposed tempo test. STC and PRC correspond to the self-imposed tempo.

3. Results

The preliminary analysis of data (box-plot graph) highlights that in the cases of the computer-imposed time performance coefficient (speeds 1 and 2), the self-imposed tempo coefficient and the personal optimum rhythm coefficient, there haven't been identified extreme values. We present for example the box-plot for the performance coefficient and for the personal optimum rhythm coefficient.

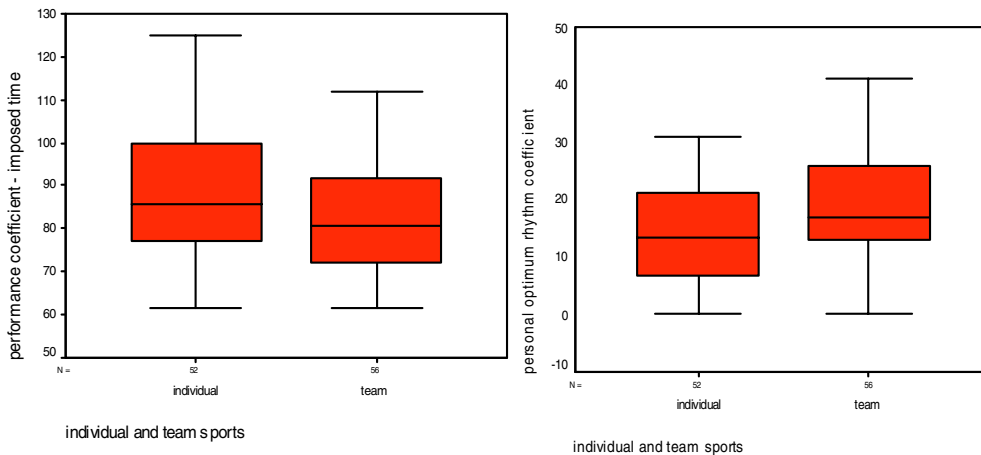


Fig. 1. (a) Extreme values – performance coefficient; (b) Extreme values – personal optimum rhythm coefficient

Through the t test for independent samples, we checked if there were significant statistical differences between the two groups of athletes (practicing some individual and team sports), by comparing the means of the dependent variables – computer-imposed time performance coefficient, self-imposed tempo coefficient and personal optimum rhythm coefficient. This t test is specific to between group designs.

The conditions for the t test application are met:

- group independence - each subject belongs to one single group and these groups are independent;
- the dependent variable is quantitative, measured on the interval scale;
- the dependent variable is normally distributed, according to Kolmogorov-Smirnov test ($p > 0.10$)
- homogeneity of variances - groups must belong to populations with equal variances. To test these conditions, we used the Levene test. Because the results in this test are not significant ($p > 0.05$), variances are equal.

Table 1. Results “Individual” group - “Team” group (computer-imposed time performance coefficient)

Variables	N	m	s	t	df	p	d	Confidence interval	
								low	high
Group				2,35	106	,021	0,45	1,051	12,360
Individual sports group	52	88,7	16,4						
Team sports group	36	54,8	7,27						

The analysis of the results for the computer-imposed time performance coefficient (speeds 1 and 2) showed in table no. 1 emphasizes that:

- the mean of the computer-imposed time performance coefficient in subjects from the “Individual” sports group ($m_{is} = 88.7$) is significantly greater ($p < 0.05$) than that of the subjects in the “Team” group ($m_{ts} = 81.9$);
- the effect size index ($d = 0.45$) shows a relatively important difference between the computer-imposed time performance coefficient obtained by the athletes performing team sports and the subjects performing individual sports;
- the confidence interval (95%) for the difference between means is comprised between the low value of 1.051 and the high value of 12.360.

Table 2. Results “Individual” group - “Team” group (self-imposed tempo coefficient)

Variables	N	m	s	t	df	p	d	Confidence interval	
								low	high
Group				1,37	106	,173	0,26	-0,694	3,811
Individual group	52	43,5	6,38						
Team group	36	42,0	5,40						

The analysis of the obtained results for the self-imposed tempo coefficient showed in table no. 2 emphasizes that:

- the mean of the self-imposed tempo coefficient (time - measured in seconds, in which the task has been completed) in subjects from the “Individual” group ($m_{is} = 43.5$) is not significantly greater ($p < 0.05$) than that of the subjects in the “Team” group ($m_{ts} = 42$);
- the effect size index ($d = 0.26$) shows a small difference between the self-imposed tempo coefficient obtained by the athletes performing team sports and the subjects performing individual sports;
- the confidence interval (95%) for the difference between means is comprised between the low value of -0.694 and the high value of 3.811. The confidence interval also includes the value 0, an aspect corresponding to the statistical decision.

Table 3. Results “Individual” group - “Team” group (personal optimum rhythm coefficient)

Variables	N	m	s	t	df	p	d	Confidence interval	
								low	high
Group				- 2,74	106	,007	0,53	-8,324	-1,340
Individual sports group	52	14,0	8,23						
Team sports group	36	18,8	9,91						

The analysis of the obtained results for the personal optimum rhythm coefficient showed in table no. 3 emphasizes that:

- the mean of the personal optimum rhythm coefficient (number of errors related to the total number of stimuli for the respective test) in subjects from the “Individual” group ($m_{is} = 14.05$) is significantly smaller ($p < 0.05$) than that of the subjects in the “Team” group ($m_{ts} = 18.8$);

- the effect size index ($d = 0,53$) indicates an important difference between the personal optimum rhythm coefficient obtained by the athletes performing team sports and the subjects performing individual sports;
- the confidence interval (95%) for the difference between means is comprised between the low value of -8.324 and the high value of -1.340.

4. Conclusions

1. The objectivation of the components of this complex quality should be made according to the sports branch technical pattern and, from this perspective, the intersegmental coordination influences the performance getting in the analyzed sports branches.

2. The computer-imposed time performance coefficient providing information about the self-control capacity, the adaptation to task, the reaction time and the effective task-solving registers values significantly greater in athletes performing individual sports as compared to those performing team sports. This fact can be explained by the technicality of individual events imposing the movement fine adjustment and by the mechanisms providing the movement high parameterization at each repetition.

3. As for the self-imposed tempo coefficient, subjects practicing sports games register a task completion time better than in individual sports, although the difference is not significant from the statistical point of view. This can be explained by a quicker processing capacity in players, as a result of the training specific exertions.

4. The personal optimum rhythm coefficient emphasizes that the athletes performing technical individual events register a smaller number of errors as compared to the subjects practicing team sports, which can be translated by a better synchronization of one's own limb movements, according to the event requirements.

This study results provide information useful to coaches in their training strategy, for scientifically conducting the sports training. The research data will also be used by the sport psychologist, who will conceive stimulation programs for the less-performing characteristics (self-control capacity, adaptation to task, reaction time and effective task solving), associated to motor coordination.

References

- Aniței, M. (2007). *Psihologie experimentală*. Editura Polirom, Iași, (Chapter 6).
- Hirtz, P. (2001). *Perioadele sensibile și dezvoltarea coordonării motrice în ontogeneză*. Sport la copii și juniori, nr 122, București (30-41) - traducere din Scuola dello Sport, nr IX, 1990 (pp. 55).
- Horghidan, V., Mitrache, G., & Tüdös, Ș. (2001). *Psihologie normală și patologică*. Editura Globus, București, (Chapter 4).
- Mitrache, G., & Tüdös, S. (2004). *Psihomotricitate și limbaj*. Editura Cartea Universitară, București. (Chapter 3).
- Popa, M. (2004). *Statistică psihologică cu aplicații SPSS*. Editura Universității, București (Chapter 5).
- Roșca, R. (2001). *Manual PSISELTEVA*. RQ plus, București.
- Schmidt R., & Wrisberg, C. (2000). *Motor learning and performance*. Human Kinetics, Champaign, IL, USA (Chapter 3).